

PRACTICE AND APPLICATIONS

STUDENT HELP

➔ **Extra Practice**
to help you master
skills is on p. 797.

EXPONENTIAL FORM Write the expression in exponential form.

17. two cubed 2^3 18. p squared p^2 19. nine to the y th power 9^y
 20. b to the eighth power 21. $3 \cdot 3 \cdot 3 \cdot 3 \cdot y$ $3^4 y$ 22. $t \cdot t$ t^2
 23. $c \cdot c \cdot c \cdot c \cdot c \cdot c$ c^6 b^8 24. $5 \cdot x \cdot x \cdot x \cdot x \cdot x$ $5x^5$ 25. $4x \cdot 4x \cdot 4x$ $(4x)^3$

EVALUATING POWERS Evaluate the power.

26. 10^2 100 27. 5^2 25 28. 8^2 64
 29. 6^4 1296 30. 10^5 100,000 31. 7^4 2401
 32. 4^6 4096 33. 9^3 729 34. 2^5 32

EVALUATING EXPRESSIONS Evaluate the expression for the given value of the variable.

35. 4^n when $n = 5$ 1024 36. b^4 when $b = 9$ 6561 37. x^6 when $x = 10$ 1,000,000
 38. c^6 when $c = 2$ 64 39. w^3 when $w = 13$ 2197 40. p^2 when $p = 2.5$ 6.25

EXPONENTIAL EXPRESSIONS Evaluate the expression for the given values of the variables.

41. $(x + y)^2$ when $x = 5$ and $y = 3$ 64 42. $m - n^2$ when $m = 25$ and $n = 4$ 9
 43. $(a - b)^4$ when $a = 4$ and $b = 2$ 16 44. $c^3 + d$ when $c = 4$ and $d = 16$ 80
 45. $(d - 3)^2$ when $d = 13$ 100 46. $16 + x^3$ when $x = 2$ 24

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 17–25
Example 2: Exs. 26–40
Example 3: Exs. 41–46
Example 4: Exs. 55–60
Example 5: Ex. 61
Example 6: Exs. 63–66



EVALUATING POWERS Use a calculator to evaluate the power. For keystroke help see Student Help box on page 11.

47. 9^5 **59,049** 48. 2^{10} **1024** 49. 5^9 **1,953,125** 50. 3^{11} **177,147**
 51. 8^6 **262,144** 52. 12^7 **35,831,808** 53. 6^8 **1,679,616** 54. 13^5 **371,293**

EXPONENTIAL EXPRESSIONS Evaluate the expression for the given value of the variable.

55. $(5w)^3$ when $w = 5$ **15,625** 56. $6t^4$ when $t = 3$ **486** 57. $7b^2$ when $b = 7$ **343**
 58. $2x^2$ when $x = 15$ **450** 59. $(8x)^3$ when $x = 2$ **4096** 60. $5y^5$ when $y = 2$ **160**
 61. **USING A TABLE** The area of a square is s^2 . Show the relationship between the side length of a square and its area by copying and completing the following table. **1, 4, 9, 16, 25**

Side length, s	1	2	3	4	5
Area, s^2	?	?	?	?	?

62. **CRITICAL THINKING** Copy and complete the table. What pattern do you see?

Power	10^2	100^2	1000^2	$10,000^2$
Evaluate	100	?	?	?

10,000; 1,000,000; 100,000,000;
 the simplified power has
 twice as many zeroes as
 the base.

63. **INTERIOR DESIGN** One room in Jean's apartment is a square measuring 12.2 feet along the base of each wall. How many square feet of wall-to-wall carpet does Jean need to carpet the room? **148.84 ft²**

64. **ART CONNECTION** In 1997 the artist Jon Kuhn of North Carolina created a cubic sculpture called Crystal Victory, shown at the left. Each edge of the solid glass cube is 9.5 inches in length. How much liquid glass did Kuhn need to make the cube? **857.375 in.³**

65. **VOLUME OF A SAFE** Each dimension of the cubical storage space inside a fireproof safe is 12 inches. What is the volume of the storage space? **1728 in.³**

66. **SWIMMING POOL** A swimming pool is 50 meters long, 19.5 meters wide, and 3 meters deep. Use the formula for the volume of a rectangular prism to find the volume of water in the pool. The formula is the length times the width times the height. **2925 m³**

67. **RAIN FOREST PYRAMID**
 The formula for the volume of a pyramid is $\frac{1}{3}$ times the height times the area of the base.
 The Rain Forest Pyramid in Moody Gardens near Galveston, Texas, is 100 feet high and 200 feet along each side of its square base. What is the volume of space inside the Rain Forest Pyramid?

► Source: Morris Architects **about 1,333,333 ft³**



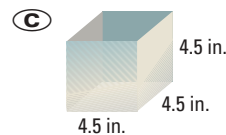
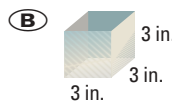
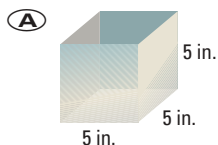
Test Preparation

69. 9; 81; 729; 6561; 59,049;
531,441; 4,782,969;
43,046,721; the last digit
of each number is 1 or 9.
The digit is 9 if the
exponent is odd and 1 if
the exponent is even.
70. $8^1 = 8$; $8^2 = 64$; $8^3 = 512$;
 $8^4 = 4096$; $8^5 = 32,768$;
 $8^6 = 262,144$;
 $8^7 = 2,097,152$;
 $8^8 = 16,777,216$; the last
digit repeats in the
following sequence:
8, 4, 2, 6, 8, 4, 2, 6, ...

★ Challenge

68. **MULTI-STEP PROBLEM** You are making candles to sell at your school's art festival. You melt paraffin wax in a cubic container. Each edge of the container is 6 inches in length. The container is one half full.

- a. What is the volume of the wax in the container? **108 in.³**
b. Which of the candle molds could hold all of the melted wax? **A**



- c. **Writing** Design a cubic candle mold different from those given that will hold all of the melted wax. Draw a diagram of the mold. Explain why your mold will hold all of the melted wax. **Sample answer: any cube with sides longer than 4.76 in.**

FINDING A PATTERN Copy the table.

Power	9^1	9^2	9^3	9^4	9^5	9^6	9^7	9^8
Evaluate	?	?	?	?	?	?	?	?

69. Evaluate the powers of 9 in the table. What pattern do you see for the last digit of each product? **See margin.**
70. Make a table like the one shown for powers of 8. Describe any patterns. **See margin.**
71. Make a table for powers of 7. Describe any patterns. **See margin.**

EXTRA CHALLENGE

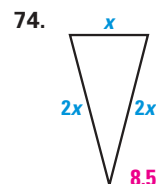
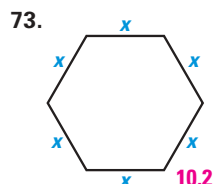
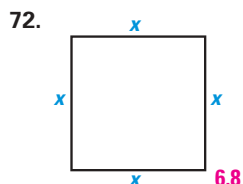
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MIXED REVIEW

71. $7^1 = 7$; $7^2 = 49$; $7^3 = 343$;
 $7^4 = 2401$; $7^5 = 16,807$;
 $7^6 = 117,649$;
 $7^7 = 823,543$;
 $7^8 = 5,764,801$; the last
digit repeats in the
following sequence:
7, 9, 3, 1, 7, 9, 3, 1, ...

GEOMETRY CONNECTION

Find the perimeter of the figure when $x = 1.7$.
(Skills Review, pp. 790–791)



FRACTIONS, DECIMALS, AND PERCENTS Write the fraction as a decimal and as a percent. (Skills Review, pp. 784–785)

75. $\frac{5}{8}$ **0.625, 62.5%** 76. $\frac{3}{4}$ **0.75, 75%** 77. $\frac{11}{20}$ **0.55, 55%** 78. $\frac{4}{25}$ **0.16, 16%**

EVALUATING VARIABLE EXPRESSIONS Evaluate the expression for the given value of the variable. (Review 1.1 for 1.3)

79. $7x$ when $x = 3$ **21** 80. $y + 2$ when $y = 10$ **12** 81. $\frac{a}{2}$ when $a = 8$ **4**
82. $m - 5$ when $m = 17$ **12** 83. $\frac{9}{b}$ when $b = 4$ **$2\frac{1}{4}$** 84. $9b$ when $b = 4$ **36**